

## PROJECT DATA

### EMV Technologies - 03GO13168

#### Cost-Effective Consolidation of Fine Aluminum Scrap for increased Remelting Efficiency

<p>Recipient: EMV Technologies, LLC</p> <p>Recipient Project Director: William Van Geertruyden 610.419.4952 115 Research Dr. Bethlehem, PA 18015</p> <p>Recipient Type: For-Profit Organization</p> <p>Subcontractor(s):</p> <p>EERE Program: Industrial Technologies</p>	<p>Instrument Number: DE-FG36-03GO13168</p> <p>CPS Number: 17828</p> <p>HQ Program Manager: Lisa Barnett 202.586.2212</p> <p>GO Project Officer: Gibson Asuquo 303.275.4910</p> <p>GO Contract Specialist: Melissa Wise 303.275.4907</p> <p>B&amp;R Number(s): ED1906020</p> <p>PES Number(s): 03-10157</p> <p>State Congressional District: PA - 15</p>
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**PROJECT SCOPE:** The objective of this project is to develop an improved process for increasing the energy efficiency of re-melting fine aluminum scrap products. The primary strategy of this project will be to reduce the surface-area-to-volume ratio by consolidating the scrap into a bulk product, making it suitable for re-melting in conventional secondary furnaces. The proposed technology will consolidated of various forms of scrap into bulk form. Additionally, the capability to produce the bulk form in a continuous manner will be investigated.

#### FINANCIAL ASSISTANCE

Approved DOE Budget:	\$75,000	Approved DOE Share:	\$75,000
Obligated DOE Funds:	\$75,000	Cost Share:	\$24,000
Remaining Obligation:	\$0		
Unpaid Balance:	\$64,243	<b>TOTAL PROJECT:</b>	<b>\$99,000</b>

Project Period: 9/30/03-9/30/05

# **TECHNICAL PERFORMANCE**

**DE-FG36-03GO13168**

**EMV Technologies, LLC**

**Cost-Effective Consolidation of Fine Aluminum Scrap for Increased Remelting Efficiency**

## **PROJECT SYNOPSIS**

The objective of this project is to develop an improved process for increasing the energy efficiency of re-melting fine aluminum scrap products. The root cause of high melt loss for fine aluminum scrap forms is the high surface-area-to-volume ratio of these products, which, upon being heated to melting temperature, results in extensive oxide formation. Thus, the primary strategy in this project will be to reduce the surface area to volume ratio by consolidating the scrap into a bulk product, making it suitable for re-melting in conventional secondary furnaces.

An efficient, cost-effective process for consolidating aluminum scrap forms that is capable of using different sized materials as inputs with prior size classification or modification is needed. The proposed technology will combine consolidation of various forms of scrap into bulk form. Additionally, the capability to produce the bulk form in a continuous manner will be investigated. Initial projected energy savings of 11.6 trillion Btu/year are estimated based on full implementation of the process.

## **SUMMARY OF TECHNICAL PROGRESS**

The Institute for Metal Forming (IMF) at Lehigh University has continued powder consolidation experiments. These experiments form the baseline study for consolidation of fine particles via room temperature extrusion. Extrusion trials using powder and the front-pad method are ongoing and have been successful. Extrusions using this approach eliminate the need for a separate consolidation step. Additionally, IMF was granted matching funding for the project from the Pennsylvania Technology Investment Authority (PTIA). The funds will go towards advancing the research efforts of powder consolidation and extrudability.

Initial fine wire scrap material has been cut manually and analyzed for its physical properties, including size and aspect ratio. The manually shredded scrap has been used for the initial feasibility trials on the hydraulic press. Fine wire scrap was sent from New York Wire to a shredding equipment supplier in order to investigate the feasibility of shredding the fine scrap into a form that can be extruded. Initial trials have been performed and will form the basis of the shredded fine wire scrap used in the extrusion experiments.

A matrix of scrap extrusion experiments has been made based on the initial trials of the manually cut wire scrap. The experiments will focus on varying the front-pad thickness to determine the optimum pressure necessary for successful extrusion to occur. A literature review of powder and scrap consolidation is ongoing.

## **SUMMARY OF PLANNED WORK**

Shredded fine wire aluminum scrap will undergo extrusion experiments based on the testing matrix developed. A metallographic analysis will be made that will determine the microstructure and porosity of the extruded product.

Members of EMV Technologies will attend the 8<sup>th</sup> International Aluminum Extrusion Technologies Seminar in Orlando, FL. The seminar focuses on the aluminum extrusion industry and is attended by many of its professionals, including suppliers of recycled aluminum.

### **PROJECT ANALYSIS**

The project is slightly behind schedule, but is within budget. No major obstacles are seen that would keep EMV Technologies from successfully completing their award on time.

### **ACTION REQUIRED BY DOE HEADQUARTERS**

No action is required from DOE Headquarters at this time.

# **STATEMENT OF WORK**

**DE-FG36-03GO13168**

**EMV Technologies, LLC**

**Cost-Effective Consolidation of Fine Aluminum Scrap for Increased Remelting Efficiency**

## **Detailed Task List**

**Task 1: Scrap consolidation and flow stress evaluation of fine powders**

**Task 2: Scrap consolidation and flow stress evaluation of baseline scrap**

**Task 3: Characterization of lab scale extrusions**

**Task 4: Review meeting to discuss critical success factors**

**Task 5: Energy, economic, and environmental assessments including lab-scale remelting testing**

**Task 6: Technical project management, coordination, and reporting**

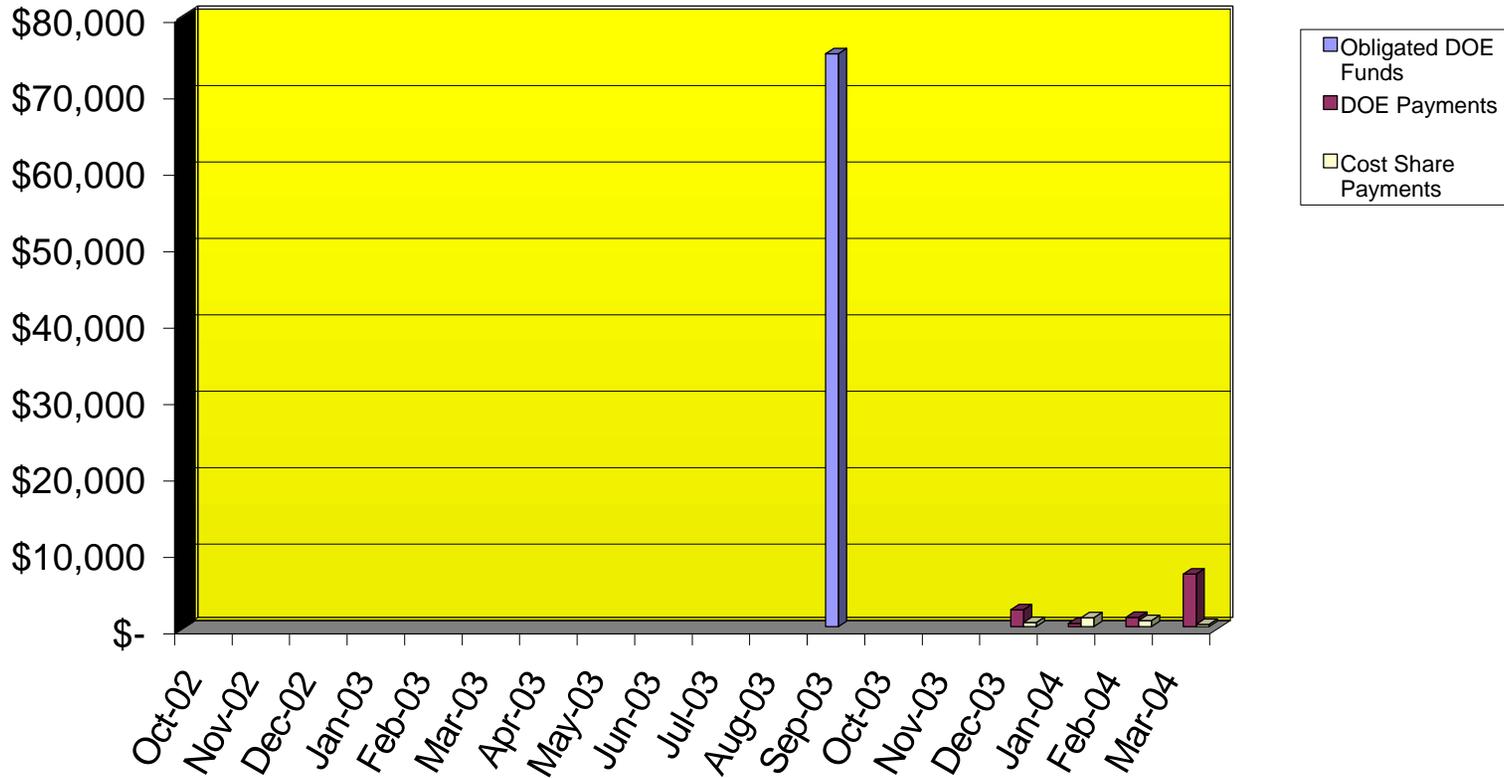
**Task 7: Project administration, financial accounting, and commercialization support**

## Project Cost Performance in DOE Dollars for Fiscal Year 2003

DE-FG36-03GO13168

EMV Technologies, LLC

Cost-Effective Consolidation of Fine Aluminum Scrap for Increased Remelting Efficiency



	Oct-02	Nov-02	Dec-02	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03
Obligated DOE Funds	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$75,000
DOE Payment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Cost Share Payment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	PFY*	Cumulative
Obligated DOE Funds	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$75,000
DOE Payment	\$0	\$0	\$2,219	\$424	\$1,230	\$6,883	\$0	\$10,757
Cost Share Payment	\$0	\$0	\$554	\$1,163	\$804	\$292	\$0	\$2,813

Approved DOE Budget:	\$75,000
Approved Cost Share Budget:	\$24,000
<b>Total Project Budget:</b>	<b>\$99,000</b>

\* Prior Fiscal Years

## EMV Technologies - 03GO13168

ID	Task Name	2004												Oct		
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug		Sep	
1	Task 1: Scrap Consolidation and Flow Stress Evaluation of Fine Powders		75%													
2	Task 2: Scrap Consolidation and Flow Stress Evaluation of Baseline Scrap			60%												
3	Task 3: Characterization of Lab Scale Extrusions			40%												
4	Task 4: Review Meeting to Discuss Critical Success Factors						0%									
5	Task 5: Energy , Economic, and Environmental Assessments								0%							
6	Task 6: Technical Project Management, Coordination and Reporting		20%													
7	Task 7: Project Administration, Financial Accounting and Commercialization Support		20%													